BORISOV, S.M., kand. tekhn. nauk

Determining the efficient speed for turning the platform of a
single-motor excavator. Stroi. i dor. mash. 9 no.3:18-19 Mr '64.
(MIRA 17:6)

BoRisov, S.N.

16(0)   P.4   PHASE I BOOK EXPLOITATION   SOV/3342

Akademiya nauk SSSR. Vychislitel'nyy tsentr

Vychislitel'naya matematika (Computer Mathematics) Moscow, Izd-vo
  AN SSSR, 1959. 148 p. (Series: Its: Sbornik, 5) Errata slip
  inserted. 3,200 copies printed.

Resp. Ed.: V. A. Ditkin, Professor; Ed.: M. V. Yakovkin; Tech. Ed.:
  S. G. Markovich.

PURPOSE: This book is intended for applied mathematicians,
  scientific workers, engineers and scientists whose work involves
  computation.

COVERAGE: This book contains 9 articles on problems in computer
  mathematics. Three articles are devoted to problems of nomography.
  There are individual articles on the numerical integration of
  first order ordinary differential equations, the approximate
  integration of multiple integrals, random values with arbitrary
  distribution, stochastic processes and the Monte Carlo method,

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Computer Mathematics   SOV/3342

    and the finding of the original function when its transform is
    a proper rational fraction. References accompany each article.

TABLE OF CONTENTS:

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Computer Mathematics

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Computer Mathematics   SOV/3342

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Computer Mathematics   SOV/3342

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Computer Mathematics   SOV/3342

Murav'yev, P. A.   On the Problem of Finding the Original
    Function When the Transform Is a Proper Rational Fraction   140

AVAILABLE: Library of Congress

Card 7/7

AC/mmh
4-26-60

BORISOV, S.N.

Nomograms with tangency contact for certain empirical functions.
Vych. mat. no.5:79-82 '59.   (MIRA 13:3)
          (Nomography (Mathematics))

BORISOV, S.N.

Nomograms for hydraulic calculation of low and high-pressure gas pipelines. Vod.i san.tekh. no.8:31-32 Ag '59.
(MIRA 12:11)
(Gas pipes) (Nomography (Mathematics))

8 (6), 24 (7) /0.4000

66177

SOV/143-59-10-17/22

AUTHORS: Al'tshul', A.D., Candidate of Technical Sciences, Do-
cent, and Borisov, S.N.

TITLE: The Calculation of Head Loss in a Turbulent Flow in
Pipes by Nomographs With Tangential Contact

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Energetika,
1959, Nr 10, pp 98-102

ABSTRACT: For determining the loss of head in a turbulent flow
in pipes the equation $i = F (Q, d)$ is derived from
the well-known Darcy-Weissbach formula in combination
with C.F. Colebrook's interpolation formula /Ref 1/;
where i - hydraulic gradient and Q - liquid flow. The
solution of the aforementioned equation by nomographs
is discussed. Usually, nomographs of adjusted points
are plotted for solving problems of the loss of head
during the motion of a liquid or gas in pipes. The
equation $i = F (Q, d)$ cannot be represented by nomo-
graphs of adjusted points and therefore nomographs
Card 1/3   with tangential contact had to be plotted. The solu-

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SOV/143-59-10-17/22

The Calculation of Head Loss in a Turbulent Flow in Pipes by Nomographs With Tangential Contact

tion of the aforementioned equation is discussed as one of the practical applications of a general method described in S.N. Borisov's paper $\boxed{\text{Ref } 4}$. Another application of nomographs with tangential contact was discussed in D.G. Laptev's paper $\boxed{\text{Ref } 5}$ for equation sets $f_2(v) = f_1(u) + f_3(w)$; $f_2(v) = \psi_1(u) + f_4(t)$. The equation $i = F(Q, d)$ is represented by a nomograph with tangential contact consisting of parallel logarithmic scales Q and i and arcs d, as shown in Fig 1. The plotting of the nomograph is described in detail. As an example, a nomograph with tangential contact is shown in Fig 3, which is used for calculating a low-pressure gas pipeline according to a generalized formula shown by D.A. Al'tshul' and others $\boxed{\text{Ref } 8}$. Parametric equations for the elements of the nomograph for $i = F(Q, d)$ are given. This paper was presented by the Kafedra gidravliki i kanalizatsii   (Chair   of Hydraulics)

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SOV/143-59-10-17/22

The Calculation of Head Loss in a Turbulent Flow in Pipes by Nomographs With Tangential Contact

and Sewerage). There are 3 diagrams and 8 references, 7 of which are Soviet and 1 English.

ASSOCIATION: Moskovskiy institut inzhenerov gorodskogo stroitel'-stva (Moscow Institute of City Construction Engineers) (A.D. Al'tshul') Vychislitel'nyy tsentr AN SSSR (Computing Center of the AS USSR) (S.N. Borisov)

SUBMITTED: April 8, 1959

Card 3/3

BORISOV, S.N.; LAPTEVA, D.G.; KHOVANSKIY, G.S.

[Collection of nomographs for calculating free surface curves in
channels of a trapezoidal cross section] Sbornik nomogramm dlia
rascheta krivykh svobodnoi poverkhnosti v kanalakh trapetseidal'-
nogo profilia. Moskva, Vychislitel'nyi tsentr AN SSSR, 1961.
—— ——— ——— Supplement. 30 1.   (MIRA 14:8)
     (Hydraulic structures)   (Nomography (Mathematics))

BORISOV, S.N.; LAPTEVA, D.G.; KHOVANSKIY, G.S.; KORKINA, A.I., tekhn. red.

[Collection of nomograms for the calculation of free surface curves in cannals of a trapezoid profile] Sbornik nomogramm dlia rascheta krivykh svobodnoi poverkhnosti v kanalakh trapetseidal'nogo profilia. Moskva, Vychislitel'nyi tsentr AN SSSR, 1961. 13 p. ___[Nomograms] Nomogrammy.   (MIRA 14:11)

(Hydraulics--Tables, calculations, etc.)

Boris ov, S. N.

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PHASE I BOOK EXPLOITATION   SOV/6352

Akademiya nauk SSSR. Vychislitel'nyy tsentr

Nomograficheskiy sbornik (Collected Papers on Nomography, no. 1.)
    Moscow, 1962. 248 p. 1800 copies printed.

Resp. Ed.: G. S. Khovanskiy, Candidate of Technical Sciences;
    I. A. Orlova; Tech. Ed.: A. I. Korkina.

PURPOSE: This collection of papers is intended for those engaged
    in research on and design of nomographs.

COVERAGE: This collection contains 27 papers concerning various
    aspects of the theory, construction, and use of nomograms for
    the solution of algebraic, functional, transcendental, and dif-
    ferential equations. No personalities are mentioned. There
    are 122 references: 102 Soviet (1 of which is a translation
    from the English), 8 German, 5 French, 2 English, 2 Spanish,
    2 Rumanian, and 1 Czech.

Card 1/10

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Collected Papers on Nomography   SOV/6352

Card 4/10

BORISOV, S.N.; KARLIN, A.V.; Prinimali uchastiye:MALYSHEVA, I.A.;
BANDURINA, R.A.

Organic silicone elastomers containing diphenyl siloxan links
in the basic chain. Kauch.i rez. 21 no.12:3-5 D '62.
(MIRA 16:1)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo
kauchuka im. S.V.Lebedeva.
                (Elastomers)   (Siloxanes)

Borisov, S.N.

PHASE I BOOK EXPLOITATION   SOV/6352

Akademiya nauk SSSR. Vychislitel'nyy tsentr

Nomograficheskiy sbornik (Collected Papers on Nomography, no. 1.)
    Moscow, 1962. 248 p. 1800 copies printed.

Resp. Ed.: G. S. Khovanskiy, Candidate of Technical Sciences;
    I. A. Orlova; Tech. Ed.: A. I. Korkina.

PURPOSE: This collection of papers is intended for those engaged
    in research on and design of nomographs.

COVERAGE: This collection contains 27 papers concerning various
    aspects of the theory, construction, and use of nomograms for
    the solution of algebraic, functional, transcendental, and dif-
    ferential equations. No personalities are mentioned. There
    are 122 references: 102 Soviet (1 of which is a translation
    from the English), 8 German, 5 French, 2 English, 2 Spanish,
    2 Rumanian, and 1 Czech.

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Collected Papers on Nomography   SOV/6352

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Collected Papers on Nomography   SOV/6352

        This paper is based on the author's re-
        port at the Conference on Computational
        Mathematics in Moscow, November 1959.

II. Stammberger, A.   (Scientific Director of the Nomogra-
     phic Group of the Institute of Applied Mathematics and
     Mechanics of the German Academy of Sciences, Berlin).
     Nomography in the German Democratic Republic   15.

        Translation of a report in German pre-
        sented at the Computing Center of the
        Academy of Sciences of the USSR (Mos-
        cow) at the end of May 1962 and at the
        First All-Union Geometric. Conference
        (Kiyev), on 28 May 1962.

Card 3/16

Collected Papers on Nomography

Card 4/16

BORISOV, S.N. (Moskva)

Combined use of two-step tables and alignment nomograms. Nom.
sbor. no.2:82-84 '64.

Automatizing the computation of nomogram scales. Ibid.:85-90
(MIRA 18:3)

BORISOV, S.M., kand. tekhn. nauk; YAMINSKIY, V.V., kand. tekhn.
        nauk, retsenzent
        [Air-chamber friction clutches] Pnevmokamernye friktsion-
        nye mufty. Moskva, Izd-vo "Mashinostroenie," 1964. 133 p.
                                        (MIRA 17:5)

KHODANOVICH, I.Ye.; BORISOV, S.N.; GALIULLIN, Z.T.; KRIVOSHEIN, B.L.

Determining the location of a gas-gathering point on the
field on the basis of minimal capital investment. Trudy
VNIIGAZ no.21/29:10-13 '64.   (MIRA 17:9)

BORISOV S. N.

Dialkylsilanes and dialkyldichlorosilanes. S. N. Borisov, B. N. Dolgov, and M. G. Voronkov. U.S.S.R. 105,223, July 25, 1957. The title compds. are produced simultaneously from dialkylchlorosilanes by distg. them over anhyl. AlCl₃.   M. Hauch

Borisov, S.N.

AUTHORS: Borisov, S.N.,   Voronkov, M.G.,   Dolgov, B.N.   62-11-19/29

TITLE: Disproportionation of the Trialkylsilanes
              (Disproportsionirovaniye trialkilsilanov).

ABSTRACT: It is shown here that the trialkylsilanes disproportion
              under the influence of $AlCl_3$.

              The character of the rearrangement is determined by the
              structure of the trialkylsilane as well as by the reaction
              condition and the quantity of $AlCl_3$. There are 1 figure,

              and 4 references, 2 of which are Slavic.

ASSOCIATION: Institute for Silicate Chemistry of the AN USSR and Leningrad
              State University (Institut khimii silikatov Akademii nauk
              SSSR i Leningradskiy gosudarstvennyy universitet).

SUBMITTED: June 20, 1957.
Card 1/2

Disproportionation of the Trialkylsilanes   62-11-19/29

AVAILABLE: Library of Congress

Card 2/2

AUTHORS: Borisov, S. N., Voronkov, M. G., Dolgov, B. N.   74-12-3/4
            (Leningrad).

TITLE: Halides of Aluminum and Silico-Organic Compounds (Galogenidy alyumi=
            niya i organicheskiye soyedineniya kremniya).

ABSTRACT: Aluminum chloride, which contains no water, is frequently used as a
            catalyzer in organic chemistry. The chemistry of silico-organic com=
            pounds has developed considerably in the course of recent years. In
            their chemical behavior they are often similar to the corresponding
            organic compounds, but there are also decisive differences. The pre-
            sent article deals with the reactions in the individual classes of
            the silico-organic compounds with aluminum halides, mainly with alu=
            minum chloride. This survey comprises periodicals and patents publi=
            shed until October 1956. The following chapters are dealt with:
            1.) Alkylation and arylation reactions of silicon halides in the
            presence of aluminum chloride.
            2.) Reactions of aluminum halides with ethers in orthosilicic acid,
            alkylalkoxysilanes and alkoxyhalide silanes.
            3.) Reactions of aluminum chloride with azyloxysilanes.

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Halides of Aluminum and Silico-Organic Compounds.   74-12-3/4

4.) Reactions of aluminum halides with siloxanes abd silanoles.

5.) Reactions of aluminum halides with alkyl-halide-silanes.

Here the reactions of silicon hydrogens are not taken into account.

6.) Reactions of aluminum halides with tetraalkyl- and tetrarylsilanes.

7.) Reactions of aluminum halides alkyl- and aryl halides silanes of the type $R_n SiX_{4-n}$ (n = 1 - 3).

8.) Reactions of aluminum chloride with silicon-hydrocarbons and alkylchloride silanes which contain the halide atom in the alkyl rest.

There are 5 tables, and 246 references, 79 of which are Slavic.

AVAILABLE: Library of Congress.

1. Aluminum halides   2. Silico-Organic compounds-Halides

Card 2/2

BORISOV S.N.

7

V. Catalytic transformations of alkyldichlorosilanes and di-
alkylchlorosilanes in the presence of aluminum chloride.
B. N. Dolgov, M. G. Voronkov, and S. N. Borisov (State
Univ., Leningrad). Zhur. Obshchei Khim. 27, 709-14 (1957).
— Distn. of 81.2 g. EtSiHCl₂ with 20.5 g. AlCl₃ until sub-
limation of the latter began in 3 hrs. gave after fractionation
of the distillate 45.9 g. EtSiHCl₂, 7.3 g. EtSiH₂Cl, and 22 g.
EtSiCl₃; a similar result was obtained on refluxing this
mixt. 3 hrs. When 200 g. EtSiHCl₂ and 40 g. AlCl₃ was
heated in autoclave 15 hrs. at 248-62° explosions took place
during the collection of gaseous products and during opening
of the autoclave; a 2nd run after 40 hrs. at 230-40° again
gave gases which exploded on contact with air, but the
liquid portion yielded EtSiH₂Cl, EtSiCl₃, and Et₂SiCl₂.
The off-gases contained H and some unidentified Si deriv. A
similar reaction with FeCl₃ as catalyst gave no rearrange-
ment of EtSiHCl₂. Heating 66.1 g. BuSiHCl₂ and 28 g.
AlCl₃ run as in the 1st expt. above gave 3.1 g. BuSiH₂Cl
and Bu₂SiCl₂. Similarly, Et₂SiHCl and AlCl₃ gave a mod-
ate yield of Et₂SiCl₂ and Et₂SiH₂. Pure Et₂SiH₂Cl, b. 68°,
d₄ 0.9013, n_D 1.3975; Et₂SiHCl₂, b₈ 75.2°, 1.0512, 1.4162;
Et₂SiCl₂, b₇₆₀ 68°, 1.5892, 1.4253; Et₂SiCl₂, b₇₆₀ 129.1°,
1.?, 1.4325.   The ... reaction mechanism is dis-
cussed on the basis of transfer of hydride ion from Si to the
complex of halosilane with AlCl₃.   G. M. Kosolapoff

BORISOV, S. N.

11334. (Russian.) Reaction of Triethylsilane With Alkyl Halides. Reaktsiia Trietilsilana s galogenalkilami. B. N. Dolgov, S. N. Borisov, and M. G. Voronkov. Zhurnal Obshchei Khimii, v. 27, Mar. 1957, p. 716-719.

A study of the interaction of trialkylsilanes with alkyl-, cyclo-alkyl-, alkenyl-, and arylhalides. Catalytic quantities of anhydrous aluminum chloride call forth a vigorous exothermal reaction of combined hydration and halogenation, which causes the formation of the corresponding hydrocarbon and trialkylhalide-silane.

l-Leningradskiy qosudardstvennyy university i inst. Khim Silikatov akad. naut SSSr

Borisov, S. N.

Distr: 4E1j/4E2c(j)   7

Catalytic transformations of ethyl acetate under pressure. B. A. Bolotov and S. N. Borisov (State Univ., Leningrad). Zhur. Obshchei Khim. 27, 1237-42(1957); cf. C.A. 50, 2410J.—Passage of EtOAc and H at 275-400°/10 atm. over activated Cu catalyst gave Me₂CO, MePrCO, iso-BuMeCO, Pr₂CO, other ketones, and hydrocarbons of the same C content as the ketones above. Raising the pressure to 100 atm. lowered the yields of ketones and increased that of hydrocarbons. The decompn. of EtOAc appears to proceed through 2 paths: decompn. to 2AcH and decompn. to Me₂CO. The ketone formation is ascribed by aldol condensation of AcH. This indicates that EtOAc is not a likely intermediate in formation of ketones and hydrocarbons from EtOH.   G. M. Kosolapoff

BARISOV, S.N.

DOLGOV, B.N.; BORISOV, S.N.; VORONKOV, M.G.

Reaction of dialkylchlorosilanes with aluminum chloride. Zhur.
ob. khim. 27 no.8:2062-2066 Ag '57.   (MIRA 10:9)

1. Leningradskiy gosudarstvennyy universitet i Institut khimii
silikatov Akademii nauk SSSR.
                                   (Silane)

AUTHOR: BORISOV,S.N., VORONKOV,M.G., DOLGOV,B.N.   20-1-25/64
TITLE: Isomeric Silapentanes and New Ways Leading to their Synthesis.
         (Izomernyye silapentany i novyye puti ikh sinteza, Russian)
PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 114, Nr 1, pp 93-96
         (U.S.S.R.)

ABSTRACT: The properties of the known silicon-hydrocarbons of the type
$R_n SiH_4$ have hitherto not been investigated with sufficient
thoroughness. The only possible way of determining these proper-
ties with any degree of exactitude is that by obtaining the
corresponding alkile chlorsilanes by litium-aluminum hydride

$$R_n SiCl_4 + (4-n) LiAlH_4 \rightarrow R_n SiH_{4-n} + (4-n)(LiCl+AlCl_3).$$

In order to solve the problem concerning the influence exercised
by the position of the silicon atom in the skeleton of silicon
carbide upon the properties of the alkile silanes a number of
silapentanes C H Si was synthetized which must be described as
corresponding pentanes.
In order to be able to obtain the new silapentanes new methods
of synthetization were found. (See tables 1 and 2).

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20-1-25/64,

Isomeric Silapentanes and New Ways Leading to their Synthesis.

As expected, the influence exercised by the isomery of the radical upon the process of the modifications of the physical constants of the butyl silanes were of the same kind as e.g. in the case of butyl alcohol. The rapid reaction of the caustic hydrolysis of the silapentanes was reduced from $RSiH_3$ to R_3SiH, as shown by a diagram.

(With 2 Tables, 1 Diagram, and 9 References).

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

BORISOV, S. N. Cand Chem Sci -- (diss) "Study of the reactions of the conjugated hydrogenation-dehalogenation of silicoorganic compounds." Len, 1958. 14 pp (Len Order of Lenin State Univ im A. A. Zhdanov), 100 copies (KL, 13-58, 93)

-16-

VORONKOV, M.G., kand. khim. nauk, otv. red.; BORISOV, S.N., kand. khim. nauk,
red.; TRAVIN, N.V., red. izd-va; KRUGLIKOVA, N.A., tekhn. red.

[Chemistry and practical utilization of silicon organic compounds;
papers] Khimiia i prakticheskoe primenenie kremneorganicheskikh
soedinenii; trudy. Leningrad, Izd-vo Akad. nauk SSSR. No.6.[Papers,
discussion, resolutions] Doklady, diskussii, reshenie. 1961. 351 p.
(MIRA 14:11)

1. Vsesoyuznaya konferentsiya po khimii i prakticheskomu primeneniyu
kremneorganicheskikh soyedineniy, 2d, Leningrad, 1958.
(Silicon organic compounds)

BORISOV, S. N.

AUTHORS: Borisov, S. N., Stavitskiy, I. K.   62B-2-1/8

TITLE: Vinyl Containing Silicon Organic Rubber.(Vinilsoderzha-
             shchiy kremniyorganicheskiy kauchuk.).

PERIODICAL: Kauchuk i Rezina, 1959, Nr.2. pp. 1 - 5. (USSR).

ABSTRACT: This is a review article discussing the manufacture of
             silastomers by substituting the methyl group by vinyl
             radicals in polydimethylsiloxanes and vulcanising the
             compounds. The monomers were first synthesised in
             1945 (Ref.1). Details of the synthesis of monomers, as well as of
             the synthesis and vulcanisation of vinyl silastomers
             developed by Dow Corning Corporation in the U.S.A. and
             by Midland Silicones Ltd., in the U.K. are given. Table
             1: the dependence of the physical-mechanical properties
             of vulcanisates of vinyl silastomers on the concentration
             of vinyl groups: Table 2: the dependence of the strength
             of vulcanisates on the properties of the accelerator;
             Table 3: the dependence of the strength of the vulcanisates
             on the quantitity of the accelerator; Table 4: the deter-
             mination of the structure of cross-linking/of bonds vulcanisates
             of vinyl silastomers; Table 5: properties of covulcani-
             sates of butyl rubber and vinyl silastomers. There are
Card 1/2   32 References: 6 Russian, 26 English.

Vinyl Containing Silicon Organic Rubber.   62B-2-1/8

ASSOCIATION: All-Union Research Institute for Synthetic Rubber im.
            S. V. Lebedev. (Vsesouuznyy nauchno-issledovatel'skiy
            institut sinteticheskogo kauchuka im. S. V. Lebedev).

AVAILABLE: Library of Congress.
Card 2/2

            1. Polydimethylsiloxanes   2. Vinyl compounds (polymerized) -
            Preparation.   3. Vulcanizates   4. Vinyl silastomers

SOV/79-28-12-30/41

AUTHORS: Borisov, S. N., Voronkov, M. G., Dolgov, B. N.

TITLE: On Reactions of Alkyl Dichloro Silanes With Chlorohydrocarbons
                (O reaktsiyakb alkildikhlorsilanov s khloruglevodorodami)

PERIODICAL: Zhurnal obshchey khimii, 1958, Vol 28, Nr 12, pp 3292-3297 (USSR)

ABSTRACT: According to reference 1 methyl dichloro silane reacts with chloro-
                benzene at 150-300° in the presence of $AlCl_3$ according to the
                scheme

$$CH_3SiHCl_2 + C_6H_5Cl \longrightarrow CH_3(ClC_6H_4)SiCl_2 + H_2.$$
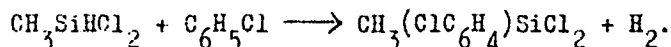
                At high temperature without catalyst two parallel reactions take
                place (I and II). According to references 4 and 5 the reaction of
                the alkyl dichloro silanes with allyl and methallyl chloride (with
                1 % platinum) takes place mainly according to scheme 4, with by-
                products also occurring. As is known, the formation of alkyl tri-
                chloro silanes and dialkyl dichloro silanes in the reaction of
                $RSiHCl_2$ with halogen olefins (Ref 5) is explained according to schemes (V)
                and (VI). Based on what was said the authors were interested in
                investigating more in detail the reaction (V) hitherto experimental-
Card 1/3   ly not dealt with. The reaction of ethyl dichloro silane with

On Reactions of Alkyl Dichloro Silanes With Chlorohydrocarbons   SOV/79-28-12-30/41

n.-propyl, isopropyl and allyl chloride was carried out. This reaction $C_2H_5SiHCl_2$ + RCl $\xrightarrow{AlCl_3}$ $C_2H_5SiCl_3$ + RH (VII), where R$=C_3H_5$, iso- and n.$=C_3H_7$, takes place very slowly at room temperature, however, very rapidly at 50-60°. From the table it may be seen that in the case of isopropyl chloride, where the chlorine atom is more movable than in n.-C_3H_7Cl, the transformation of ethyl dichloro silane to ethyl trichloro silane is correspondingly higher. In the reaction (VII) in the aliphatic series the reactivity of the S-H bonds, and not that of the C-Cl bonds, plays a decisive role. It may be assumed that in the reaction (VII) first the mobile complex of ethyl dichloro silane with $AlCl_3$ is formed, which causes the transformation of ethyl dichloro silane into ethyl chloro silane. Thus, it was demonstrated that ethyl dichloro silane with aliphatic chlorohydrocarbons in the presence of $AlCl_3$ enters a combined hydrogenation - halogenation reaction, reduces them to the corresponding hydrocarbons and is transformed into ethyl trichloro silane itself. There are 1 table and 13 references, 12 of which

Card 2/3

On Reactions of Alkyl Dichloro Silanes With Chlorohydrocarbons SOV/79-28-12-30/41

are Soviet.

ASSOCIATION: Leningradskiy gosudarstvennyy universitet i Institut khimii silikatov Akademii nauk SSSR (Leningrad State University and Institute of the Chemistry of Silicates of the Academy of Sciences, USSR)

SUBMITTED: November 20, 1957

Card 3/3

5(3)`   SOV/63-4-3-20/31

AUTHOR: Borisov, S.N., Candidate of Chemical Sciences

TITLE: Conference on the Chemistry and Practical Application of Silicon-Organic
               Compounds

PERIODICAL: Khimicheskaya nauka i promyshlennost', 1959, Vol 4, Nr 3,
               pp 402-403 (USSR)

ABSTRACT: The second All-Union Conference on the Chemistry and Practical Application
               of Silicon-Organic Compounds was convened last year in Leningrad by
               the Otdeleniye khimicheskikh nauk (Department of Chemical Sciences) and
               the Institut khimii silikatov AN SSSR (Institute of the Chemistry of
               Silicates of the AS USSR, Vsesoyuznoye khimicheskoye obshchestvo imeni
               D.I. Mendeleyeva (All-Union Chemical Society imeni D.I. Mendeleyev),
               Gosudarstvennyy komitet Soveta Ministrov SSSR po khimii (State Com-
               mittee on Chemistry at the Council of Ministers USSR, and the Leningrad-
               skiy sovet narodnogo khozyaystva (Leningrad National Economic Council).
               It was attended by 700 persons, among them scientists from the people's
               democracies. Corresponding Member of the AS USSR K.A. Andrianov read
               a paper on the principal research trends in the field of silicon-organic
Card 1/4   compounds; V. Bažant (Prague) on the work of the Khimicheskiy institut

SOV/63-4-3-20/31

Conference on the Chemistry and Practical Application of Silicon-Organic Compounds

Czechoslovatskoy AN (Chemical Institute of the Czechoslovakian AS);
S.A. Golubtsov on the direct synthesis of methyl-, ethyl- and phenyl-
chlorosilanes; S.S. Olenin on an electrochemical theory of the direct
synthesis; P. Rośćiszevski (Warsaw) on the activity of various con-
tact masses in the direct synthesis of methyl-chlorosilanes; G.N.
Nikishin and D.A. Kochkin (IOKh AS USSR) on the behavior of polyhalogen-
hydrocarbons in direct synthesis; I. Chermak (Czechoslovakia) on roent-
genographic investigation of silicon-copper alloys; V.A. Ponomarenko
(IOKh AS USSR) and L.I. Kartasheva (Institut nefti AN SSSR - Petroleum
Institute of the AS USSR) on various reactions in the addition of hydro-
silanes to unsaturated compounds; Corresponding Member of the AS USSR
R.Kh. Freydlina on the telomerization of hydrosilanes with olefines;
N.N. Tishina, G.N. Mal'nova and M.Ye. Dolgaya on the development of the
synthesis of monomers by the reaction of thermal and catalytic arylation
of silicon-chloroform and alkyldichlorosilanes; A.D. Petrov on the re-
activity of carbofunctional silicon-organic compounds; M.G. Voronkov
(IKhS AS USSR) on the reactivity of the Si-O bond in organo-siloxanes
in their reaction with alcohols, alkoxy- and halogen-silanes; N.F. Orlov,
B.N. Dolgov and M.G. Voronkov on new methods of synthesis of metal-

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SOV/63-4-3-20/31

Conference on the Chemistry and Practical Application of Silicon-Organic Compounds

silicon-organic compounds; Yu.K. Yur'yev on the mutual transformation of five-membered saturated heterocycles; Yu.K. Yur'yev together with Z.V. Belyakova and G.B. Yelyakov on the possibilities of applying tetraacyloxysilanes in organic synthesis; N.N. Sokolov, L.V. Gornets, T.Z. Lizgunova. Ye.M. Oparina , G.S. Tubyanskaya and A.S. Yermilov on the thermal stability of polyorganosiloxane liquids and films; A.A. Zhdanov and K.A. Andrianov on polyorganosiloxanes and polyorganosiloxane-metalloxanes; N.B. Baranovskaya on "cold" vulcanization of siloxane rubber; L.N. Kozlovskaya, A.I. Glukhova, K.I. Andrianov and K.F. Kaluzhenina on the heat-resistant rubber-like material based on   combining polydimethylsiloxane with fluoro-polymers; M. Kuchera (Brno) on alkaline polycondensation of octamethylcyclotetrasiloxane; A.P. Kreshkov on the achievements and tasks of the analysis of silicon-organic compounds; S.V. Syavtsillo on methods of controlling the manufacture of silicon-organic products; Yu.P. Yegorov and Ya.I. Ryskin on spectral study of the nature of bonds and the structure of silicon-organic compounds; K.K. Popkov, V. Bažant and V.S. Fikhtengol'ts on the quantitative determination of alkylchlorosilanes and various radicals in organosiloxanes; coworkers of K.A.

Card 3/4

SOV/63-4-3-20/31

Conference on the Chemistry and Practical Application of Silicon-Organic Compounds

Andrianov and B.N. Dolgov on electric and thermal insulation coatings on the base of silicon-organic resins; M.Ya. Borodin, V.I. Pakhomov and B.A. Kiselev on the application of silicon-organic compounds for foam-plastics, heat-resistant plastics, etc; D.P. Novikov on the state and the planned development of producing silicon-organic compounds. The Conference recommended to eliminate shortcomings in this branch of chemical industry and technology. The next conference will take place at the end of 1960 in Moscow.

Card 4/4

STAVITSKIY, I.K.; BORISOV, S.N.

Hydrolysis of dimethyldichlorosilane by sodium aluminate
solutions. Vysokom.soed. 1 no.10:1496-1501 O '59.
(MIRA 13:3)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut sinteti-
cheskogo kauchuka.
(Silane) (Sodium aluminate)

STAVITSKIY, I.K.; BORISOV, S.N.; PONOMARENKO, V.A.; SVIRIDOVA, N.G.;
ZUYEVA, G.Ya.

Polydimethylgermanasiloxanes. Vysokom.soed. 1   no.10:
1502-1506 O '59.   (MIRA 13:3)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo
kauchuka i Institut organicheskoy khimii AN SSSR.
        (Siloxanes) (Germanium compounds)

5(3)
AUTHOR: Borisov, S. N.   (Leningrad)   SOV/74-28-1-4/5

TITLE: Elemental-organic Silicon Compounds
            (Elementoorganicheskiye soyedineniya kremniya)

PERIODICAL: Uspekhi khimii, 1959, Vol 28, Nr 1, pp 63-95 (USSR)

ABSTRACT: The present paper considers monomeric organic and several
            "pseudo-organic" silicon compounds which contain atoms of the
            elements in the various groups of the periodic system of
            D. I. Mendeleyev. This review, which includes the Soviet and
            foreign scientific publications up to July, 1958, does not
            consider the silicon organic derivatives of the alkali metals
            and Grignard (Grin'yar) reagents. Elements of the I. and
            II. Group. According to (Ref 1) hydrogen is given off and 62.7%
            of the OH-groups of the diols react when a mixture of
            symmetrical tetraethyl disiloxane and metallic magnesium is
            heated to 150-200°. $HgCl_2$ reacts similarly with sodium

            trimethyl silanolate in dioxane (Ref 2). With metal oxides of
            the I. and II. group $SiCl_4$ forms chlorometallic siloxanes of

            the type $MeOSiCl_3$ or $ClMeOSiCl_3$ (Ref 5). The chloromethyl

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trimethylsilane (Ref 7) was synthesized in 1945. This compound forms the Mg derivative very easily. From this compound the conversion to the silicon organic mercury compound is possible. Using the reaction of Grignard it has been possible to obtain compounds of type $(CH_3)_3SiCH_2HgR$. The splitting of these compounds using HCl in ethanol depends upon the character of the R group and has a varying character. Elements of the III. Group. Boron. The preparation of tris-(trimethylsilyl) borate was reported in 1948 (Ref 8). It was found (Ref 9) that trialkoxy silane reacts with boric acid according to diagram (6) to give a good yield ($>$70%) of tris-(trialkylsilyl) borates when there are at least 2 alkyl radicals and no methyls on silicium. The character of the polyorganic borosiloxanes obtained by further condensations is determined from the starting reagents and from the nature of the catalysts involved. By reacting borohalides with alkyl alkoxysilanes (Refs 15-17) a substitution of the alkoxy groups by the halogen atoms takes place according to the general diagram (12). The alkyl borohalides are similar to the borohalides in their reaction with alkoxysilanes. The yield of tris-(trialkylsilyl) borates approaches 75-85% (Ref 12). The substitution of boric acid anhydride for boric acid increases the yield up to 92%.

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Elemental-organic Silicon Compounds   SOV/74-26-1-4/5

The known tris-(trialkylsilyl) borates (Table 1) are high-boiling, oily, transparent, colorless and odorless liquids. They are used as catalysts in the arylation of alkylhalogen hydrosilanes (Refs 20, 21) and in the polycondensation of dimethyl siloxanes and plasticizers (Ref 8). References 16, 17, 23, and 24 report the splitting of hexa-alkyl (hydro) disiloxanes with boron halides. Boron halides also split linear (normal) and cyclic polyorganic siloxanes (Refs 19, 20, 23, 25). Steric factors are responsible for the velocity with which the splitting of cyclosilanes by boron chloride in the case of "methyl trimers" takes place and the slowness of the reaction using "ethyl tetramers". The properties of compounds of the type $(R_3SiO)_3B$ are given in table 1. Hexa-alkyl disiloxanes react with B_2O_3 at 250-300° and high pressure (Ref 9). The possibility of this reaction must be considered in regard to the effect of boron anhydride additives on the properties of polyorganic siloxanes. Aluminum. Diagram (27), which includes the original state of aluminum siloxanes was suggested in 1892 to explain the reaction of $ROSiCl_3$ with

Card 3/12 $AlCl_3$ (Ref 30). A similar reaction scheme was later suggested

Elemental-organic ,ilicon Compounds   SOV/74-28-1-4/5

(Refs 31, 32) to explain the reaction of AlX$_3$ with alkylalkoxy silanes. Reference 33 reported the isolation of trimethyl siloxydichloro aluminum. Diagram (27a) is suggested for the preparation of polyorganic siloxanes by the method of "heterofunctional condensation" (Ref 34). The entrance of Al into the siloxane structure in the reaction of aluminum with hydroxyl-containing silicon organic compounds depends directly upon the tendency of the silanoles to undergo a homo-condensation (Table 2). Elements of the IV. Group. Titanium. The first report concerning the synthesis of individual compounds which contain Si-O-Ti bonds was made in 1955 (Ref 55). References 62 and 63 indicate the possible bonding of titanium siloxanes in the reaction of hydroxy-containing silicon organic compounds with ortho-titanates, however, compounds of the type (R$_3$SiO)$_4$Ti have only recently been obtained (Refs 12, 56-58,64). Properties of various silyl titanates are given in table 3. Zirconium. Crystalline tetra-(trimethylsiloxy) zirconium has been obtained by reacting trimethyl silanol with isopropyl zirconate (Ref 64). On account of the high sublimation temperature the Zr derivative might not be monomeric.

Card 4/12 $[(C_2H_5)_3SiO]_4$Zr has also been obtained.

Germanium, Tin, Lead.   Silicon organic derivatives of metals of the IV. group with $SiCH_2M$ and SiC_6H_2M groups can be prepared according to diagram (43)(Refs 70-73). Properties of several silicon organic derivatives of Ge, Sn, Pb are given in table 4. Table 5 shows the effect of various reagents. Elements of the V. Group. Phosphorous: Si-O-P Bond. In 1860 D. I. Mendeleyev reported (Ref 91) that in the reaction of the ethyl ester of ortho silicic acid with phosphorous pentachloride in the molar ratio of 1:4 half of the PCl_5 remained unchanged and the reaction products did not contain the expected $SiCl_4$. According to (Ref 94) the reaction of ethoxy chlorosilanes $(C_2H_5O)_n \cdot SiCl_{4-n}$ with an excess of phosphorous oxychloride occurs at above 175° and yields the ethyl chloride, $SiCl_4$, and a white amorphous substance with the composition $SiP_2O_6Cl_2$. This compound ("silicopyrophosphoryl chloride") is split by phosphorous pentachloride and forms $SiCl_4$ and $POCl_3$. The structure of this composition was not positively confirmed, but there are doubtless Si-O-P groups present.

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Elemental-organic Silicon Compounds   SOV/74-28-1-4/5

It is known that the reaction of trimethyl ethoxysilane with
PCl_5 occurs with the substitution of the alkoxy group by
halogen. $(CH_3)_3SiOR$ reacts similarly with PCl_3 (Refs 102, 103).
In reference 105 it is suggested that the formation of
tris-(trialkylsilyl) phosphites takes place according to
diagram (59). It has been shown recently (Ref 107) that the
reaction of R_3SiOR' with H_3PO_4 is a possible way of
synthesizing tris-(trialkylsilyl) phosphites. In a similar way
(61) the tris-(trialkylsilyl) phosphate can be obtained by
reacting trialkoxysilanes with phosphoranhydride (Ref 97). The
reaction of trialkylalkoxysilanes with phosphoric acid occurs
according to diagram (62)(Ref 108). The structure of the
bis-(trialkylsilyl) phosphates was proved by showing that the
compounds thus prepared do not give a complex with cuprous
chloride. In their spectra frequencies corresponding to the
valence oscillations for the P-H and P=O bonds are observed,
and these spectra lack the characteristic frequency of the
valence oscillation of P-O-H. The reaction runs according to
diagram (62), which is a valid representation of the double
basicity of phosphoric acid, i.e.,

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Elemental-organic Silicon Compounds
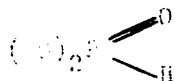
$$(O)_2P \overset{O}{\underset{H}{\diagup}}$$. In regard to the reaction of R_nSnJ_{4-n} with

trialkyl phosphites it had been assumed (Refs 109, 110) that
the compounds produced contained the tin directly bonded to the
phosphorous atom (64). A similar explanation (64) had been made
for the reaction between triorganic bromosilanes and triethyl
phosphites (Ref 111). In reference 112 this idea is shown to
be false and 2 alternate schemes are proposed for the reaction
(65, 1, 11). The basis of both schemes is the rearrangement of
Arbuzov, and their division consists only in the manner in
which the question is stated. It must be remembered that the
reaction of metal derivatives of dialkyl phosphites with
organic halogen derivatives is a convenient method for
preparing esters of phosphinic acid (Ref 114). Such reactions
are proof of the keto structure of metal derivatives, which was
previously shown by X-ray methods (Ref 115). Results which
various authors have published in regard to the reaction of
triorganic chlorosilanes with salts of dialkyl phosphorous
acids must be regarded with some reserve. Tris-(trialkylsilyl)
phosphate is obtained easily according to diagram (69)(Ref 107).

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Elemental-organic   .ilicon Compounds   SOV/74-2.-1-4/5

Trialkylphosphates react similarly (70). Table 6 gives the
properties of several trialkylsilyl derivatives of phosphoric
acid. Compounds of this type are noticeably associated. They
hydrolyse with a splitting off of the Si-C-P bond. In the
reaction between dimethyl chlorosilane and diethyl phosphate a
monomeric product is obtained (Ref 106). Diethoxy
[bis-(diethyl thiophosphate)] silane which is obtained by
reacting $(C_2H_5O)_2SiCl_2$ and $PH_4OP(S)(OC_2H_5)_2$, is the primary
product of the thermal decomposition of (triethoxysilyl)-
diethyl thiophosphate (Ref 117). The reaction process does not
end here, however, and high copolymer condensation products
form. It has been found (Refs 123-125) that in the reaction
between phosphorotrichloride (bromide) and hexa-alkyl
disiloxane the Si-C-Si bond is quantitatively broken and
trialkyl halogensilanes are formed. In 1944 the tris-
(trimethylsilyl) phosphate was separated from the products by
slowly distilling the hexamethyl disiloxane excess over P_2O_5
(Ref 126). A whole series of tris-(trialkylsilyl) phosphates
have since been produced (Ref 127). Properties of these
phosphates are given in table 7.

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Elemental-organic   Silicon Compounds

Phosphorous: Si-P and Si-C-P Bonds. The simplest compound, Si-P-H$_2$SiPH$_2$, was obtained in 1953 (Ref 128). Unstable, spontaneously combustible compounds were obtained by reacting H$_3$SiJ with white phosphorous at 20-100° (Refs 130, 131). Further reactions were described in references 133, 134, 135, 137, 138. Dialkylthio phosphoric acids associate easily with alkenyl silanes (Ref 159). Chloroanhydrides of the phosphinic acids with Si-C-P bonds can be prepared, according to references 125 and 140, by the scheme of Kleyton-Soborovskiy (84). The reaction of PCl$_3$ and O$_2$ with triethylvinyl silane exhibits peculiar properties (Ref 125). The chloroanhydride formed in scheme 84a is unstable and decomposes in distillation and when storing it. According to references 113 and 140 the derivatives of silylalkyl phosphinic acids can be obtained using scheme 85. Table 8 shows several properties of several phosphoric acids and their derivatives with Si-C-P bonds. Antimony, Arsenic, Bismuth. Arsenic reacts with H$_3$SiJ (Ref 130) similarly to phosphorous, but it is a slower reaction. The compounds formed are less volatile and also less stable than similar phosphorous compounds. In the process of halogenating

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phenyl chlorosilanes it was found that these crystalline addition compounds are formed using catalysts. The triethylsilyl phenyldiphenyl arsenic was synthesized in 1917 (Ref 70). The compound yields in benzene easily soluble crystalline additives for mercury halides with sharp melting points. This can be used for the identification of silylphenyl arsenic compounds. Later (Ref 74) the synthesis of Grignard was used in the preparation of arsenic silico-organic compounds (87). The tris-(trimethylsilylmethyl) antimony behaves as the similar phosphorous compound. Tris-(trimethylsilylmethyl) arsenic is less sensitive toward acids, but otherwise behaves similarly to the antimony compounds. The bismuth derivative is rather unstable and even gives a bismuth mirror in a nitrogen atmosphere. It is recommended to carry out the reaction with phenyl chlorosilanes in the presence of pyridine. The hydrolysis of the prepared products, which occurs with the partial destruction of the Si-O-As bonds, is accompanied by the formation of polyarsenic siloxanes. Vanadium, Niobium, Tantalum. It has been found that alkyl siloxy derivatives of vanadium form in the reaction of

Card 10/12   trialkyl vanadates with R_3SiBr (Refs 12, 146).

Elemental-organic Silicon Compounds   SOV/74-2b-1-4/5

Pentakis-(trimethylsiloxy) tantalum has been prepared by the
azeotropic distillation of isopropyl alcohol from a mixture
of silanol and penta-alkoxy tantalum in benzene according to
(91)(Ref 64). The pentakis derivative of niobium is unstable.
An attempt to purify the material by means of vacuum
sublimation caused it to split, forming octakis-
(trimethylsiloxy) dinoboxane $[(CH_3)_3SiO]_4 NbONb[OSi(CH_3)_3]_4$.

Trimethyl acetoxy silane can also be introduced into reaction
(91)(Ref 64). Elements of the VI. - VIII. Groups. There is
very little data in the scientific literature concerning
reactions of silico-organic compounds with elements of these
groups (silicon organic sulfur derivatives are not considered
in this review). Chlorometallic siloxanes form in the reaction
of $SiCl_4$ with MnO_2 and Fe_2O_3 in acetonitrile and in the

presence of $HgCl_2$ (Ref 5). It can be assumed that in the

splitting of hexa-alkyl disiloxanes by $FeCl_3$ (Ref 147)

compounds of type $R_3SiOFeCl_2$ are formed, similar to the case

where $AlCl_3$ is used. In any case this explains the gradual

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Elemental-organic Silicon Compounds   SOV/74-28-1-4/5

consumption of the $FeCl_3$ catalyst in the splitting of
siloxanes by halogen silanes.(Ref 148). The mono and
bis-triphenyl silylferrocenes have been obtained by reacting
the lithium derivatives of ferrocene with triphenyl
chlorosilanes. (Ref 149). A compound with a direct bonding
between iron and silicon atoms was recently synthesized (92)
(Ref 150). It is in the form of orange needles and has a
melting point of 70°. It is stable up to 200°, insoluble in
water, and easily soluble in organic solvents.
There are 8 tables and 150 references; 58 of which are Soviet.

Card 12/12

5.3610

AUTHORS: Stavitskiy, I. K., Borisov, S. N.

TITLE: Brief Communications. Concerning the Simultaneous
              Hydrolysis of Dimethyldichlorosilane and α-Cyanoiso-
              propoxymethyldichlorosilane

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol 32, Nr 10, pp 2366-
              2367 (USSR)

ABSTRACT: The stability toward hydrolysis of the $N \equiv C - C \overset{\diagup CH_3}{\underset{\diagdown CH_3}{=}} O-$

              group in α-cyanoisopropoxy-organochlorosilanes is described
              in the literature (Frisch, Wolf, J. Org. Chem., 19, 657,
              1953); it is also disputed (Hahn, Makrom. Chem., 11, 64,
              1953). In the present work it is shown that on simul-
              taneous hydrolysis of α-cyanoisopropoxymethyldichloro-
              silane (I) and dimethyldichlorosilane, in an acid, as
              well as in a neutral medium, the α-cyanoisopropoxy groups
              are not sufficiently stable toward hydrolysis. (I) was
              synthesized by Vdovin, V. M., in the laboratory of
Card 1/2   Petrov, A. D., corresponding member of the Academy of

Brief Communications. Concerning the
Simultaneous Hydrolysis of Dimethyl-
dichlorosilane and α -Cyanoisopropoxy-
methyldichlorosilane

75700
SOV/80-32-10-49/51

Sciences, USSR (IOKh, AN SSSR), by the reaction between
acetone cyanohydrin and methyltrichlorosilane in the
presence of pyridine. There are 4 references, 2 Soviet,
1 U.S., 1 German. The U.S. reference : Frisch, Wolf, J.
Org. Chem., 19, 657 (1953).

ASSOCIATION: All State Scientific-Research Institute of Synthetic
Rubber (Vsesoyuznyy nauchno-issledovatel'skiy institut
sinteticheskogo kauchuka)

SUBMITTED: December 8, 1958

Card 2/2

15.9206

11.2214

28162
S/138/61/000/008/004/006
A051/A129

AUTHOR: Borisov, S.N.

TITLE: Fluorine-containing elastomers (Survey)

PERIODICAL: Kauchuk i rezina, no. 8, 1961, 16 - 20

TEXT: The present article deals with a survey of three out of five known fluorine-containing elastomers based on non-Soviet data: poly(perfluoroalkyl) acrylates, fluorinated polyesters and fluoro-polymers not containing hydrogen. The polyacrylates: the emulsified polymerization of 1,1-dihydroperfluorobutyl-acrylate forms the elastomer with the following structure:

$$\left[\begin{array}{c} - CH_2 - CH - \\ \quad\quad | \\ O = C - O - CH_2 - CF_2 - CF_2 - CF_3 \end{array} \right]_n$$
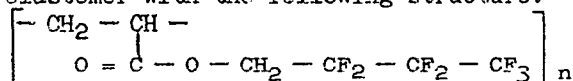
"poly-FBA" or "fluoro-rubber 1F4" (company "3M"). The polymer contains over 52% fluorine, rendering it highly oil-benzene-resistant and non-combustible similar to Kel-F, but with a lower resistance to dry heating. The oxides of bi-valent metals are the active agents of its vulcanization, the most effective vulcanizing agents being polyamides. The poly-FBA vulcanizates are ozone-resistant and with-
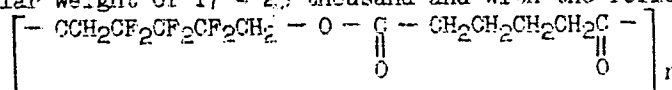
Card 1/6

Fluorine-containing elastomers

stand the action of fuming sulfuric acid, hydrocarbons, alcohols of chlorinated solvents and the action of hot synthetic lubricants based on ethers. Alkalies cause severe swelling. The high oil-resistance is maintained to a temperature of 200°C. The introduction of a simple ether bond into the poly-FBA molecule forms poly-3-perfluoromethoxy-1,1-dihydroperfluoropropylacrylate:

$$\left[\begin{array}{c} - CH_2 - CH - \\ | \\ 0 = C - 0 - CH_2 - CF_2 - CF_2 - 0 - CF_3 \end{array}\right]$$
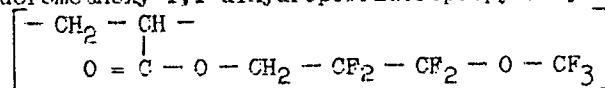
This is "2F4" or poly-FMFBA and has a lowered vitrification temperature as compared to 1F4. The 2F4 vulcanizates have an elevated frost-resistanc. Its gamma-radiation-resistance is close to Viton A. Fluoropolyesters: the condensation of 2,2,3,3,4,4-hexafluoropentadiol-1,5 and chloroanhydride of adipic acid yields an oil-heat-frost-resistant polymer : polyhexafluoropentamethyleneadipate (NA-1) with a molecular weight of 17 - 23 thousand and with the following structure:

$$\left[\begin{array}{c} - OCH_2CF_2CF_2CF_2CH_2 - 0 - C - CH_2CH_2CH_2CH_2C - \\ \| \quad\quad\quad\quad\quad \| \\ 0 \quad\quad\quad\quad\quad 0 \end{array}\right]_n$$

It is vulcanized with peroxides and retains its elastic properties and high oil-resistance within a temperature range of -72 to + 204°C, but has a high residual deformation. In external appearance it resembles NR. The fluoropolyesters are

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Fluorine-containing elastomers

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A051/A129

thought to have the highest radiation resistance of all fluoroelastomers. Fluo-
roelastomers not containing hydrogen: The formation of fluoropolymers with het-
ero-atoms in the chain would solve the problem of temperature resistance over
long periods of storage. Polymers with a chain structure of $-N-O-C-C-$
not containing hydrogen were first produced in 1955 by Barr and Hasheldin (Eng-
land) by reacting trifluoronitrosomethane quantitavely with tetrafluoroethylene
in the dark at room temperature, forming 2-perfluoromethyl-1,2-oxazetidine

$$CF_3 - N \underline{\qquad} O$$
$$CF_2 - CF_2$$

and the polymer

$$[- N(CF_3)OCF_2CF_2 -]_n$$
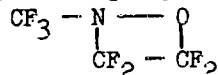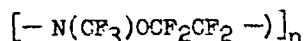
where $n \simeq 35$. Later a similar chain was formed through the cyclic intermediate
compound heptafluoronitrosopropane reacting with $CF_2 = CF_2$. In 1958, a number
of publications on this subject were made available in the USA. According to
Crawford, the free-radical polymerization can take place in a mass, solution or
emulsion and at low temperatures forms the elastomer (1 : 1) with a molecular
weight of the order 1 - 2 million. Haszeldine [Ref. 21: D.A. Barr, R.M. Haszel-
dine, C.J. Willis, Proc. Chem. Soc., 1960, no. 8, 230; Plaste und Kaut., 6,
605 (1959)] indicated that the molecular weight and the nature of the copolymers
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S/138/61/000/008/004/006
A051/A129

Fluorine-containing elastomers

of trifluoronitrosomethane with tetrafluoroethylene is determined by the purity
of the initial monomers, the exactness of the ratio 1 : 1 and the temperature of
the polymerization. Other American investigators indicated that nitrosofluoro-
carbon elastomer vulcanizes instantaneously at room temperature when in contact
with organic bases. Attention is given to the data on the production of elas-
tomers with the following structure:

$$(- N - O - CF_2CFH -) -_n \text{ , } \text{ or } (- N - O - CFH - CF_2 -)_n \text{ .}$$
$$CF_3 CF_3$$
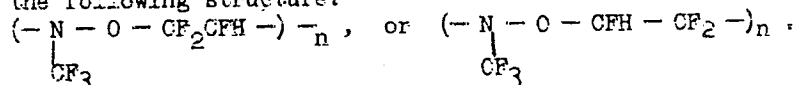
the presence of hydrogen atoms facilitating the vulcanization with peroxides,
diamines, etc. A study is being made of the products of copolymerization of
trifluoronitrosomethane and its homologues (C_2F_5NO, C_3F_7NO and $C_9F_{17}NO$) with
other fluoroolefin. The catalytic polymerization of fluoroaldehyde along the
bond $C = O$ is being investigated. An elevated thermal stability is expected of
the $CF_2 - X - CF_2 - X - (X = N, P, S, O)$ type polymer. The interaction of per-
fluoroglutarhodiamidine with perfluorobutyrhoamidine, dissolved or in solution,
yields a rubber-type polymer, which is structurally a combination of triazine
rings connected by perfluorocarbon bridges:

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2816?

S/138/61/000/008/004/006
A051/A129

Fluorine-containing elastomers
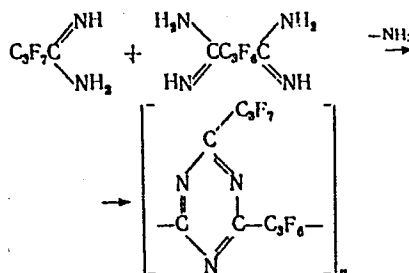
The elastomers have a T_g of 10 - 18°C, a high heat- and chemical resistance. Work is being conducted on the formation of aromatic mono- and diamidines and their combination with aliphatic perfluoroamidines. It is assumed that work is also being conducted to form materials which retain elasticity at temperatures of up to 500°C. There are 4 tables and 33 references: 1 Soviet-bloc and 32 non-Soviet-bloc. The references to the English-language publications read as follows: O.R. Pierce, G.W. Holbrook, O.K. Johannson, J.C. Saylor, E.D. Brown, Ind. Eng. Chem., 52, no. 9 783 (1960); R.E. Banks, R.N. Haszeldine, J. Oil colour

Card 5/6

2816?

Fluorine-containing elastomers

Chem. ASS., 42, no. 9, 591 (1959); L.J. Kitchch, Rubb. Age, 87, 1,038 (1960);
A.P. Stefani, J.R. Lacher, J.D. Park, Rubb. Age, 87, 1,038 (1960).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sintetlcheskogo
kauchuka im. S.V. Lebedeva (All-Union Scientific Research Insti-
tute of Synthetic Rubber im. S.V. Lebedev)

Card 6/6

30461

S/138/61/000/011/001/007
A051/A126

15,9205

AUTHORS: Borisov, S. N., Karlin, A. V., Malysheva, I. A.

TITLE: Vulcanization of cyclic dimethyl- and diethylsiloxane copolymers

PERIODICAL: Kauchuk i rezina, no. 11, 1961, 4 - 8

TEXT: A study was made of the effect of the benzoyl peroxide and $(ZnO, TiO_2,$
$Fe_2O_3)$ metal oxide additions, on the thermal stability of vulcanizate mixtures
based on dimethyldiethylsiloxane rubber. The possibility of using cyclic low-
molecular dimethyl- and diethylsiloxanes instead of the formerly used individual
methyltetramer and ethyltrimer, for the production of polydimethyldiethylsiloxane
rubbers, was further investigated. It was found that the latter, synthesized by
catalytic polymerization of cyclic dimethyl- and diethylsiloxane mixtures, do not
differ in their properties from similar rubbers produced from the methyltetramer
and ethyltetramer mixtures. The dimethylethylsiloxane polymers require a smaller
quantity of benzoyl peroxide for the vulcanization than the CKT (SKT) rubber.
Vulcanizates based on the mixtures of dimethyldiethylsiloxane rubbers, containing
titanium dioxide instead of zinc oxide, retain their elasticity for long periods
of time at 200 - 225°C, and for shorter periods at 250°C. They also have a high

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30461

S/138/61/000/011/001/007
A051/A126

Vulcanization of...

frost resistance at -70°C. It is proven experimentally, on the example of ethyl-siloxane polymers that the zinc oxide, usually contained in the rubber mixtures, increases their structuralizing processes. Since under stable conditions, the rates of polymerization of the hexaethylcyclotrisiloxane and octaethylcyclotetra-siloxane, under the effect of H_2SO_4, have the ratio of 1.84 : 1, and their weight ratio in the products of complete hydrolysis of diethyldichlorosilane, is also 70 - 75 : 30 - 25, it was assumed that the replacement of M_2-45 methylhydrolysate with M_2-4 fraction, and E_2-34 ethylhydrolysate with E_2-3 fraction, would have no significant effect on the conditions of production and properties of the dimethyl-diethylsiloxane elastomers, and would at the same time lower to a large extent the consumption coefficients of the initial monomers. The experimental polymerization was conducted in two different ways: under the action of concentrated sulfuric acid, and in the presence of an alkali. Although the mechanism of the protective action of iron oxide and titanium oxide was not established, attention is drawn to the high protective action of metal oxides with varying valencies on the si-loxane rubbers. Experiments showed that iron oxide and titanium dioxide inhibit the oxidation process of the dimethyldiethylsiloxane rubbers. Further data ob-tained showed that the addition of zinc oxide to the composition of the heat-re-

Card 2/3

30461

S/138/61/000/011/001/007
A051/A126

Vulcanization of...

sistant rubbers, based on polysiloxane rubbers, would be unsatisfactory. There are 6 tables and 4 Soviet-bloc references.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo kauchuka im. S. V. Lebedev (All-Union Scientific Research Institute of Synthetic Rubber im. S. V. Lebedev)

Card 3/3

88727

15.9205

AUTHORS: Borisov, S. N., Sviridova, N. G.

TITLE: Polydimethyl-stannasiloxane derivatives

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 1, 1961, 50-55

TEXT: The authors synthesized polydimethyl-stannasiloxane derivatives with the aim of obtaining rubbery materials resistant to high temperatures, and studied the possibility of preparing rubbers based on these compounds, in analogy to polydimethyl germanasiloxane rubbers. Corresponding to the use of "oxa" and "aza" in the nomenclature of organosilicon compounds, "stanna" is used to designate the substitution of Si atoms by Sn atoms. $SnCl_4$, $SnBr_4$ and dimethyl dichloro silane (DDS) (used for the synthesis of polydimethyl siloxane rubber C_kT (SKT)) were applied for the synthesis. The following compounds were prepared: Tetramethyl stannan (by the method described in Ref. 9), tetraethyl stannan (by the method described in Ref. 10), compounds of the type R_2SnX_2 (by the method of Refs. 9 and 11), diethyl dichloro stannan, dimethyl dibromo stannan and dimethyl

Card 1/3

88727

Polydimethyl-stannasiloxane derivatives

S/190/61/003/001/007/020
B119/B216

dichloro stannan. Dimethyl dibromo stannan proved most suitable for the synthesis of polydimethyl stannasiloxane. Dimethyl dibromo stannan was hydrolyzed together with DDS in a mixture of ammonia and alcohol at 5 - 15°C. Stannasiloxane copolymers were only obtained by hydrolysis in an alcoholic medium. The viscosity of the polymers obtained increases with increasing Sn content (relative to the Si content) of the initial mixture. Compounds of composition R_2SnX_2 on hydrolysis yield polydialkyl stannoxanes of the type (R_2SnO) n. They are insoluble in cyclic poly-dimethyl siloxanes. The polydimethyl stannasiloxanes obtained are soluble in benzene, dibutyl ether and octamethyl cyclotetrasiloxane. Their solubility decreases with increasing Sn content. Polydimethyl stannasiloxanes with 3% Sn are oily colorless liquids,

n_D^{20} = 1.404-1.405, d_4^{20} = 0.972-0.978, molecular weight 800-1000, and contain 0.07-0.15% OH' groups. The later increase of density (to 1.406) and refractive index is attributed to further condensation with the remaining OH groups. The polymers containing 8-10% Sn are colorless and of honey-like consistency, those with 18-19% Sn are yellow and resinous,

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S/190/61/003/001/007/020
B119/B216

Polydimethyl-stannasiloxane derivatives

with a density greater than 1. Similarly prepared polydiethyl-stanna-dimethyl-siloxane with~1% Sn is also resinous. Treatment of stannasiloxane (9-19% Sn) solutions in octamethyl cyclotetrasiloxane with concentrated H_2SO_4 leads to separation into two phases, an upper oily layer containing no Sn and a salt-like precipitate consisting of polymer fragments of the formula R_2SnSO_4 and $HOSnR_2SO_4H$. This indicates chain rupture at the Si-O-Sn bonds. The preparation of rubbery substances was therefore not achieved. The admixture of stannasiloxane copolymers or stannoxanes to polydimethyl siloxane rubber SKT does not improve the vulcanizates. Among other publications, the ones by K. A. Andrianov, L. M. Khananashvili, and K. A. Kocheshkov are mentioned. There are 4 tables and 14 references: 9 Soviet-bloc and 5 non-Soviet-bloc.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo kauchuka (All-Union Scientific Research Institute of Synthetic Rubber)

SUBMITTED: May 30, 1960

Card 3/3

27575
S/190/61/003/009/010/016
B110/B101

15.9205   2209

AUTHORS: Borisov, S. N., Stavitskiy, I. K. (Deceased), Karlin, A. V.,
              Malysheva, I. A.

TITLE: Ethyl siloxane elastomers. I. Copolymerization of octamethyl
              cyclotetrasiloxane with hexaethyl cyclotrisiloxane

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 9, 1961,
              1377-1382

TEXT: The highly heat-resistant polydimethyl siloxane (PDMS) rubbers are
elastic up to 250-300°C and have a low glass transition temperature (-130°C).
Replacement of CH_3 radicals by larger organic groups, e.g., methyl-phenyl
siloxane, renders the polycrystallization difficult, improves the properties
of the vulcanizate at low temperatures, but does not change the glass
transition temperature. As a direct synthesis of methyl-phenyl siloxane
is not possible, and silane chloride mixtures were formed on phenylation
of methyl dichloro silane by the Grignard synthesis, whose separation was
difficult, it was necessary to use better accessible monomers for the
production of frost-resistance rubbers. The purpose of the present paper
Card 1/6

Ethyl siloxane elastomers. ...

was the synthesis of methyl-ethyl siloxane elastomers on the basis of octamethyl cyclotetrasiloxane and hexaethyl cyclotrisiloxane. According to the nomenclature suggested by N. N. Sokolov (Metody sinteza poliorganosiloksanov (Methods of synthesis of polyorganosiloxanes), Gosenergoizdat, 1959, pp. 127-132) the former is denoted by M_2-4, the latter by E_2-3. These two components, obtained by hydrolysis of dimethyl dichloro silane and diethyl dichloro silane, respectively, were co-polymerized in the cold in the presence of 2% by weight of concentrated H_2SO_4 under stirring for 5 hr with subsequent addition of 1% of weight of H_2O. At almost equimolecular initial ratio, co-polymerization takes place readily, forming rubber-like high-molecular polymers. Table 1 presents the properties of the resultant polydimethyl-diethyl siloxane rubbers. The molecular weights were determined by the equation derived by Burry-Korolev for high-molecular linear PDMS: $[\eta]_{benzene} = 2.15 \cdot 10^{-4} M^{0.65}$.

Filling and vulcanization were similar as with CKT(SKT) rubber (polymer = 100; powdered silica gel $У$-333 (U-333) = 50; ZnO = 5; benzoyl peroxide = 2 parts by weight). The assigned and real content of dimethyl siloxane links in the polymers was determined indirectly by IR spectra on Card 2/6

Ethyl siloxane elastomers. ...

the 1267 cm^{-1} band of the Si-CH$_3$ bond. With increasing content of diethyl
siloxane chains in the copolymer, the elasticity of vulcanizates decreases
in parallel to the decrease of their swelling in organic solvents. When
$(C_2H_5)_2SiO$ (DE) $>$ 15 mole%, no rubber-like vulcanizates were obtained by
the treatment commonly used for SKT (10 min vulcanization in the press at
120°C; 6 hr additional thermostat vulcanization at 200°C with a temperature
rise of 1°C/min). If, however, the second stage (6 hr at 200°C) is
omitted, compounds containing 45 mole% DE give rubber-like vulcanizates.
With 1-15 mole% DE their strength corresponded to that of SKT vulcanizates,
10% DE vulcanizate was well elastic. They were more frost-resistant than
SKT. The coefficient of frost resistant was $\sim$1 at -60 to -70°C for
rubbers with 6-10 mole% DE. Acid catalysts which required troublesome
washing-out were replaced by alkaline catalysts: M$_2$-4 and E$_2$-3 (92 : 8)
were polymerized under stirring and heating in a stream of dry N$_2$ on the
reflux condenser in the presence of a catalyst from cyclodimethyl siloxanes
and KOH. The properties of vulcanizates obtained with 0.0075% KOH
practically correspond to those obtained with 2% H$_2$SO$_4$. The authors thank

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27575
S/190/61/003/009/010/016
B110/B101

Ethyl siloxane elastomers. ...

N. V. Kozlova for taking the spectra, N. G. Sviridova for performing the
alkaline polymerization. There are 2 figures, 4 tables, and 7 references:
6 Soviet and 1 non-Soviet. The reference to English-language publication
reads as follows: Ref. 1: R. A. Pike, J. E. McMahon, V. B. Jex et al.,
J. Organ. Chem., 24, 1439, 1959; T. C. Williams, R. A. Pike, F. Fekete,
Industr. and Engng. Chem., 51, 939, 1959.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sinteti-
               cheskogo kauchuka im. S. V. Lebedeva (All-Union Scientific
               Research Institute of Synthetic Rubber imeni S. V. Lebedev)

SUBMITTED: December 6, 1960

Table. Properties of elastomers obtained by co-polymerization of methyl
tetramer with ethyl trimer in the presence of H_2SO_4.

Legend: (1) Polymer properties; (2) characteristics of standard
vulcanizates; (3) sample no.; (4) molar ratio of $M_2-4 : E_2-3$; (5) % volatile
content, 3 hr, 150°C; (6) solubility in benzene; (7) molecular weight·10^{-3};
(8) tensile strength; (9) relative elongation; (10) coefficient of frost
Card 4/6

BORISOV, S.N.

Copolymers of fluorinated olefins. Kauch.i rez. 20 no.7:8-14
Jl '61.
(MIRA 14:6)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo
kauchuka imeni S.V.Lebedeva.
(Olefins)   (Fluorine compounds)

S/138/62/000/006/001/008
A051/A126

15, 9205

AUTHORS: Borisov, S.N., Karlin, A.V., Chudesova, L.M., Galil-Ogly, F.A.,
             Chebysheva, L.M.

TITLE: Properties of ethylphenylsiloxane rubbers

PERIODICAL: Kauchuk i rezina, no. 6, 1962, 3 - 6

TEXT: The relation between the methylphenylsiloxane ring content in rubbers
and their optimum frost resistance was determined by producing and investigating
polymers containing from 2 to 10 mol % of the methylphenylsiloxane rings. Optimum
frost resistance was found in rubbers based on polymers and containing 8 mol %
methylphenylsiloxane rings. The substitution of the latter with diethylsiloxane
rings yields elastomers with the following characteristics: a) the ability to
vulcanize with lesser quantities of benzoyl peroxide and with weak vulcanizing
agents, such as dicumyl peroxide; b) a higher resistance to accumulation of resi-
dual deformations after compression; c) resistance to destruction in closed sys-
tems. A study of synthesized ethylphenylsiloxane elastomers showed that they
combine the advantages of both the diethylsiloxane and methylphenylsiloxane elas-

Card 1/2

Properties of....

tomers. They vulcanize with a lesser quantity of benzoyl peroxide and dicumyl peroxide, as compared to the methylphenylsiloxane rubbers. They have a higher resistance to destruction in closed systems and regeneration capacity after simultaneous action of elevated temperatures and loads. The rubbers based on the ethylphenylsiloxane polymers are equal to the methylphenylsiloxane rubbers in their thermal and frost resistance, within a temperature range of -100 to +250°C. The properties of ethylphenylsiloxane rubbers are improved by substituting the $У$-333 (U-333) silica gel with the more active БС-280 (BS-280). There are 2 tables and 3 figures.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo kauchuka im. S.V. Lebedeva i Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti (All-Union Scientific Research Institute of Synthetic Rubber im. S.V. Lebedev and the Scientific Research Institute of the Rubber Industry)

Card 2/2

32350
S/190/62/004/001/012/020
B101/B110

\15\9\205

AUTHORS: Borisov, S. N., Karlin, A. V., Malysheva, I. A.

TITLE: Ethyl siloxane elastomers. III. Methyl-ethyl siloxane rubbers

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 1, 1962, 74-79

TEXT: The preceding communication II was published in Kauchuk i rezina, no. 11, 4, 1961. To obtain rubbers which remain elastic even at low temperatures, C_2H_5 was partially substituted for the CH_3 group in polydimethyl siloxane rubber. N. S. Shvarts catalytically synthesized the methyl-ethyl-dichlorosilane from methyl-dichlorosilane and ethylene: boiling point 99.3 - 100°C/756 mm Hg; n_D^{20} = 1.4189; d_4^{20} = 1.0612, MR_D = 34.01. From aqueous-alcoholic hydrolysis of this monomer the following was obtained (total yield 63% by weight): 1,3,5 -trimethyl-1,3,5-triethyl-cyclo-

Card 1/\/\$\$

Ethyl siloxane elastomers. ...

32350
S/190/62/004/001/012/020
B101/B110

t r isiloxane (I) (b. p. 78 - 78.4°C/10 mm Hg, n_D^{20} = 1.4108; d_4^{20} = 0.9457, MR_D = 69.43, η^{20} = 2.00 cp) and ,1,3,5, 7-tetramethyl-1,3,5,7,-tetra-ethyl-cyclo-tetrasiloxane (II) (b. p. 110 - 111°C/10 mm Hg; n_D^{20} = 1.4161; d_4^{20} = 0.9548 ; MR_D = 92.75, η^{20} = 4.29 cp). Under the action of acid or alkaline catalysts (H_2SO_4 or KOH), new, high-molecular, rubber-like poly-mers resulted from copolymerizing cyclic methyl-ethyl- and dimethyl siloxanes (ratio 96 : 4 to 84 : 16). These polymers contain $(CH_3)_2SiO$ and $CH_3C_2H_5SiO$ links having molecular weights from 260,000 to 973,000. The samples vulcanized with 1 part by weight of benzoyl peroxide, 2 parts by weight of TiO_2, 50 parts by weight of powdered silica gel per 100 parts by weight of polymer showed resistance to frost increased with increasing content of $CH_3C_2H_5SiO$ links (Fig. 1). After 10 days' heating at 200°C, tensile strength was 41 kg/cm^2; relative elongation 230%. Comparison with diethyl- and methyl-phenyl siloxane rubbers showed for the resistance to

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Ethyl siloxane elastomers. ...

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S/190/62/004/001/012/020
B101/B110

frost the following order: $(C_2H_5)_2SiO = (CH_3)C_6H_5SiO > (CH_3)C_2H_5SiO.$ Therefore, the synthesis of polydimethyl siloxanes with $(C_2H_5)C_6H_5SiO$ or $(C_6H_5)_2SiO$ links is considered to be prospective. There are 2 figures, 3 tables, and 7 references: 5 Soviet and 2 non-Soviet. The reference to English-language publications reads as follows: K. E. Polmanteer, M. J. Hunter, Rubb. World, 138, 95, 1958; J. Appl. Polymer Sci., 1, 3, 1959.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo kauchuka im. S. V. Lebedeva (All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev)

SUBMITTED: February 1, 1961

Card 3/4 3

S/080/62/035/004/021/022
D205/D301

15.9701

AUTHORS: Borisov, S. N., Karlin, A. V., and Sviridova, N. G.

TITLE: Simultaneous polymerization of octamethyl cyclotetra-
siloxane and decamethyl pentacyclosiloxane

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 4, 1962, 917-919

TEXT: In the production of the thermally stable polymethylsiloxane
resin CKT (SKT) low-molecular cyclic dimethylsiloxanes are employed
as the starting product. The influence of the starting products
composition on the molecular weight and technological properties of
the polymethyl disiloxane resin was not sufficiently investigated
before. Polymerization of the binary mixtures of octamethyl cyclo-
tetrasiloxane (M_2-4) and decamethal cyclopentasiloxane (M_2-5) ta-
ken in the weight ratios 90:10, 70:30, 50:50, 30:70, 10:90 was per-
formed by stirring in the presence of (a) 2% W/W concentrated H_2SO_4
for 5 hours at room temperature with subsequent introduction of 1%
W/W of H_2O; (b) 6% W/W aluminum sulfate dihydrate, taken as a 33%

Card 1/3

Simultaneous polymerization of ...

S/080/62/035/004/021/022
D205/D301

paste of the catalyst in siloxane oil, for 5 hours at $100^{\circ}C$; (c) catalyst based on potassium siloxanolates for 3 hours at $140^{\circ}C$ in a current of dry nitrogen. The increase of the M_2-5 content from 10 to 90% lowers the molecular weight of the elastomers from 700,000 to 500,000 roughly. This increase leads also to a somewhat higher relative elongation and freezing resistance coefficients in the vulcanized resins. These influences are less pronounced when method (b) is used. The polymers obtained by this method are of a higher molecular weight than those obtained by method (a). The conversion in both methods was more than 90%. The conversion in the alkaline method (c) was lower. With the increase of the M_2-5 content from 10 to 90% the amount of volatiles increased from 14 to 17%. The properties of the resins prepared by the 3 methods were comparable. It is concluded that the differences induced by the varying composition of the starting mixture are practically insignificant. There are 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: W. Patnode and D. F. Wilcock, J. Am. Chem. Soc., 68, 358, (1946); M.J.

Card 2/3

Simultaneous polymerization of ...   S/080/62/035/004/021/022
                                          D205/D301

Hunter, J. F. Hyde et al, ibid., 68, 667, (1946).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sinte-
               ticheskogo kauchuka im. Akad. S. V. Lebedeva (All-
               Union Scientific Research Institute of Synthetic Rub-
               ber im. Academician S. V. Lebedev)

Card 3/3

BORISOV, S.N.

       Fluorine-containing elastomers. Kauch. i rez. 20 no.8:16-20
       Ag '61.   (MIRA 14:8)

       1. Vsesoyuznyy nauchno-issledovatel'skiy institut sinteteches-
       kogo kauchuka imeni S.V. Lebedeva.
               (Elastomers) (Fluorine)

BORISOV, S.N. (Moskva)

Nomographic representation of a problem. Nom. sbor. no.1:45-50
'62.
(MIRA 16:5)

(Nomography (Mathematics))

BORISOV, S.N.; SVIRIDOVA, N.G.; AVER'YANOVA, L.A.

Synthesis and vulcanization of methylethylsiloxane
rubbers. Kauch.i rez. 21 no.9:1-4 S '62.   (MIRA 15:11)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut
sinteticheskogo kauchuka im. S.V. Lebedeva.
                (Rubbers, Synthetic)
                (Siloxanes)

L 10748-63   EPR/EWP(j)/EPF(c)/EWT(m)/BDS--AFFTC/ASD--Ps-4/
Pc-4/Pr-4--BM/WW/MAY

ACCESSION NR: AP3003286·   S/0138/63/000/006/0006/0010

AUTHOR: Borisov, S. N.; Karelina, G. G.

TITLE: Dependence of vinylsiloxane rubber vulcanizates on the content of
vinyl groups in elastomers

SOURCE: Kauchuk i rezina, no. 6, 1963, 6-10

TOPIC TAGS: polymerization, vulcanization, properties of vulcanizates, vinyl-
phenylsiloxane rubbers, methylvinylsiloxane rubbers, tensile strength, elongation,
heat resistance, low-temperature resistance, network density, deformation, MV-1,
VF-1

ABSTRACT: The effect of the vinyl-group content on the properties of vinylsiloxane
vulcanizates has been studied in detail. Dimethylsiloxane rubber containing 0.5
to 10 mol% RC_2H_3SiO (where R = CH_3 or C_6H_5) groups were used. The monomers were
synthesized by hydrolysis of equimolar mixtures of dimethyl- with methylvinyl-
or vinylphenyldichlorosilane in calculated amounts of cyclodimethylsiloxanes and
polymerized in the presence of concentrated sulfuric acid or aluminum sulfate di-
hydrate. Mixes containing 100 parts rubber and 50 parts U-333 light-colored filler

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L 10748-63
ACCESSION NR: AP3003286

were vulcanized with benzoyl peroxide or sulfur and thiuram. The optimum dose of benzoyl peroxide for vinylphenylsiloxane rubbers (I) was found to be 0.4% regardless of the content of the vinylphenyl group. For effective sulfur vulcanization the vinyl-phenyl-group content in rubbers must be at least 1%. The optimum degree of vulcanization is attained faster for methylvinylsiloxane rubbers (II) than for I, in which the vinyl groups are hindered by phenyl radicals at the same Si atoms of the polymer chain. The tensile strength and elongation of sulfur and peroxide vulcanizates II and I containing 1 to 10% vinyl groups vary from 42 to 28 kg/cm² and 255 to 140%. The heat resistance of I vulcanizates is somewhat higher than that of II vulcanizates, owing to the hindering effect of the phenyl groups; peroxide vulcanizates exhibit higher heat resistance than sulfur vulcanizates. Vulcanizates of rubbers containing 1% vinyl groups (MV-1 and VF-1 rubbers) exhibit satisfactory properties after aging for 10 days at 250C. The low-temperature resistance of the vulcanizates is determined mainly by the second radical at the Si atom. It is higher in the presence of phenyl groups, which retard rubber crystallization. The low-temperature resistance at -60C of sulfur vulcanizates of MV-1 and VF-1 rubbers is higher than that of peroxide vulcanizates. Increasing the network density of MV-1 vulcanizates by using larger amounts of benzoyl peroxide increases their low-temperature resistance. Study of the deformation of vulcanizates after compression showed that it is lowest for peroxide vulcanizates of

Card 2/2   All-Union Scientific Research of Synthetic Rubber

BORISOV, S.N.

L 18757-63   EFR/EWP(j)/EPF(c)/EWT(m)/BDS   AFFTC/ASD   Ps-4/Pc-4/Pr-4
RM/WW/MAY   G/0004/63/010/007/0400/0401   -

ACCESSION NR: AP3005761

AUTHOR: Borissow, S. N.

TITLE: Cold-resistant polysiloxane elastomers (Paper presented at the II. Dresden Symposium for Organic and Non-Silicate Silicon Chemistry, held from 26 to 30 March 1963. Translated from the Russian by E. Hassenruck and J. A. Kohler, Leipzig)

SOURCE: Plaste und Kautschuk, v. 10, no. 7, 1963, 400-401

TOPIC TAGS: Polysiloxane elastomer, silicon rubber, cold-resistant rubber, monomer, elastomer, rubber

ABSTRACT: Organic silicon rubbers with outstanding, high cold resistance were studied to test additional monomers for improving the cold resistance of poly-dimethylsiloxane rubber; to determine the influence of the quantity of different modifying links on the cold resistance of rubbers; to develop cold-resistant organic silicon elastomers which contain only two structures in the chain instead of three but which possess the favorable properties of three-component copolymers; to select suitable siloxane types that can be used in the production of rubber types within the required temperature range. Figures 1, 2 and 3 of Enclosure 1

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L 18757-63
ACCESSION NR: AP3005761   2

show the cold resistance of various elastomers as a function of concentration,
content, and elongation. The dependence of the glass temperature of the elas-
tomers as a function of diphenylsiloxane content is shown in Fig. 4 of Enclosure
2. The elastomer with 75 mol-% diethylsiloxane links had a glass temperature of
-136°C, the lowest thus far observed in a linear, high molecular polymer. Various
modifying monomers can be used in the production of silolane rubbers. Orig. art.
has: 6 figures and 1 table.

ASSOCIATION: Allunions-Forschungsinstitut fur synthetischen Kautschuk, Leningrad
(All-Union Research Institute for Synthetic Rubber, Leningrad)

SUBMITTED: 00   .   DATE ACQ: 14 Aug 63.   ENCL: 04

SUB CODE: CH   ·   NO REF SOV: 008   OTHER: 002

Card   2/02

BORISOV, S.N.

Properties of siloxane elastomers containing Si-H bonds. Kauch. i rez. 22 no.10:5-8 O '63. (MIRA 16:11)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut sinteticheskogo kauchuka im. S.V. Lebedeva.

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"Proizvodstvo polisiloksanovykh elastomerov v Sovetskom Soyuze."

report submitted for 35th Intl Cong, Industrial Chemistry, Warsaw, 15-19 Sep 64.

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ACCESSION NR: AP4042336   S/0138/64/000/007/0001/0006

AUTHOR: Borisov, S. N., Marey, V. A.

TITLE: Properties of siloxane rubbers containing chloromethyl groups

SOURCE: Kauchuk i rezina, no. 7, 1964, 1-6

TOPIC TAGS: polymer, elastomer, siloxane rubber, methyl chloride group, chloromethyl group, chloromethyl containing elastomer, silicone rubber, silicone rubber elasticity, silicone rubber vitrification, silicone rubber crystallization, sulfur vulcanized resin, benzoyl peroxide vulcanized resin, vulcanizate cold brittleness

ABSTRACT: Products obtained by the cohydrolysis of dimethyldichlorosilane and methyl-chloromethyldichlorosilane or mixtures of these compounds were polymerized with octamethylcyclotetrasiloxane at room temperature in the presence of concentrated H_2SO_4 to obtain elastomers containing up to 25 mol. % of $(ClCH_2)(CH_3)$ SiO chains. Tests indicated that the molecular weight decreased as the chloromethylsiloxane component increased (894,000 at 2 mol. % to 428,000 at 25 mol. %). Low temperature behavior studies (liquid N cooling for

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about 15 min. to about 10C below vitrification, then heating at 3 C/min) showed minimal elasticity at -90 to -100C. The temperature curves of elasticity for the vitrification-maximum: elasticity region of modified siloxane elastomers were analogous to those for amorphous polymers (see Fig. 1 in the Enclosure). Crystallization capacity deteriorated at higher con- tents of (ClCH$_2$) (CH$_3$) SiO chains, which was illustrated by plotting the dependence of the dynamic elasticity modulus on temperature and on exposure period at a constant temperature of -80C. Tests on vulcanized elastomers (benzoyl peroxide, silica white filler, 10 min. in a press at 120C and 6 hrs. in air at 200C; or sulfur, furnace black, 80 min. in a press at 160C) showed that the chloromethyl groups attached to silicone atoms participate regardless of the type of vulcanizing agent used. However, the thermal stability of sulfur vulcanized resins is substantially lower.   Resins from rubber containing 10 mol. % methyl chloride groups appear suitable for operations at -70C (cold brittleness coefficient around 1. 0) (see Fig. 2 in the Enclosure), but the authors question the propriety of the present testing procedure (10 min. in cooling mixture, 5 min. stressed and 5 min. unstressed) in view of their findings on the crystallization characteristics. "Monomer samples were contributed by Ye. P. Mikheyev and G. V. Motsarev; Ye. A. Sidorovich also took part in the work." Orig. art. has: 3 tables and 5 graphs.

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ACCESSION NR: AP4042336

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SUBMITTED: 00   ENCL: 02

SUB CODE: MT   NO REF SOV: 013   OTHER: 006

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